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### Performance measurement using balanced scorecard: A case study of pipe industry

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**ABSTRACT**

Strategic assessment of the organizational performance in the industrial environment is one of the primary and essential prerequisites for developing improvement plans in organizations. This issue is so crucial that one of the on-going affairs in the organizations is to identify the weakness and strength points. One of the effective models for assessing the organizations performance is balance scorecard (BSC) model, which examines all the aspects of an organization. The proposed study of this paper investigates the existing strategic objectives in the strategy map of a pipe company located in city of Shiraz, Iran. The proposed study of this paper designs a questionnaire and distributes it among 31 managers, 94 regular employees and 110 customers of this firm for the fiscal year ended 2011. The results of our study indicate that the firm could reach 41.4% of its financial objectives, 87.38% of its customers' requirements, 66.13% of internal processes and 70.94% of its learning necessities according to four major BSC requirements. In summary, the firm could reach 66.45 % of its requirements during the fiscal year of 2011.

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## 1. Introduction

Balance scorecard (BSC) methodology is considered as an extensive strategic planning system, which has become popular among managers and business owners. BSC is a management system, which helps organizations clearly specify their objectives and strategies based on different characteristics within the organization (Olson & Slater, 2002). Kaplan and Norton (1992) are believed to be first who introduced the idea of BSC. They implemented BSC as a performance evaluation system for 12 firms in USA in 1992. The primary objective of BSC is to replace and make the necessary changes on traditional performance evaluation techniques, which only focused on financial indexes to calculate more complete and effective evaluation of organizational performance. Despite the fact that financial figures are only part of BSC model, they are still considered as the most important aspects of organizational performance evaluation in BSC. Nevertheless, other perspectives of traditional model

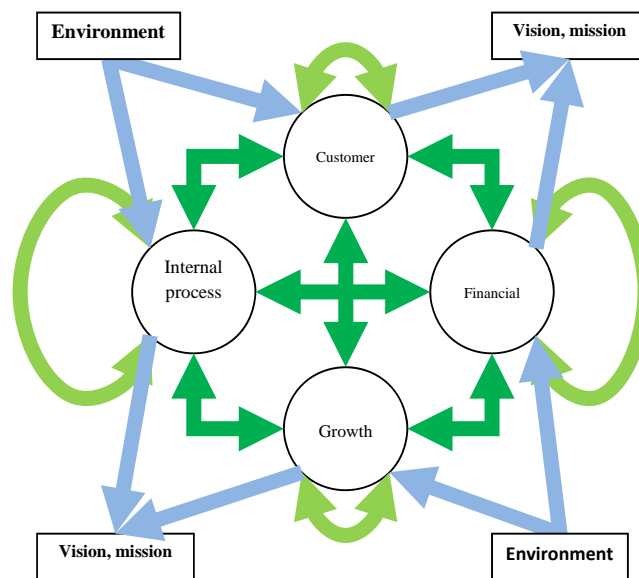
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such as customer, internal business processes and employee's growth and learning are also needed to be considered, so that performance evaluation model could find a balance among various BSC figures. These aspects are necessary for perception and implementation of a perfect performance measurement systems and formation of a general set of organization performance indexes for strategic investigation of all objectives and activities within organizations (Huang, 2009; Huang et al., 2011). BSC includes four perspectives, which are summarized as follow,

1. Financial aspect: this perspective considers how organizations benefit from their strategic activities.
2. Customer aspect: this perspective pays more attention to the issue, which organizations should benefit of their inherent and available resources for the distinction among their competitors.
3. Internal business process aspect: This includes all strategic activities within an organization to satisfy stockholder and customer's expectations. General process is initiated by perception of customer's requirements and operational as well as sale's figures.
4. Growth and learning aspect: Any organizations wishes to retain permanent activity and development should rely on constant growth and innovation.

According to Kaplan and Norton (1996a, 1996b), organizations have to concentrate on some principals such as promotion of employee's abilities, information system performance, persuasion, etc. This aspect includes three main criteria including employee satisfaction, employee continuity and efficiency. Any business unit needs to create performance evaluation indexes by four BSC criteria and performance indexes have to be chosen based on some measurable figures. Index selection plays an essential role for investigating the required industry performance, since we may enhance efficiency of manufacturing operations and create significant advantages by accurate investigation of these indexes. Performance key indexes should be considered very carefully for achievement of strategic objectives in every four aspects of BSC (Wu et al., 2011). These relationships point to the dependence among financial and nonfinancial indexes. A structured BSC method should include mutual relationships among various aspects and measuring indexes of these aspects (Wang et al., 2010). Fig. 1 shows details of BSC perspectives.



**Fig.1.** Relationships among different aspects of BSC

There are literally various applications of BSC, Safari Kahreh (2012), for instance, performed an empirical study to analyze customer relationship management strategy using BSC. Shojaee et al.

(2012) presented a study to setup appropriate strategies using the implementation of balanced score card in four perspectives of customers, processes, learning and financial. They gathered important factors through three different brainstorming sessions and prioritize them using TOPSIS method. Abdolshah et al. (2012) determined strategic objectives in the strategy map of one of the best producer of electric auto part makers in Iran called Electric Vehicle Co. East and they were evaluated based on BSC perspective and they assigned appropriate values to available factors based on a hybrid method consist of analytical hierarchy process (AHP) technique with Fuzzy logic.

Hemati et al. (2012) presented a hybrid algorithm of BSC and quality function deployment to determine the criteria affecting implementation of successful outsourcing. Namazi et al. (2011) proposed an integrated framework for outsourcing using balanced score card and ELECTRE III. Azar et al. (2012) presented an empirical investigation in a case study of part maker industry using BSC method for supplier selection strategy using TOPSIS and VIKOR. Khaki et al. (2012) proposed a new method for improving efficiency of decision making units through BSC-DEA technique. Mirzamohammadi and Basirat Fard (2012) studied factors affecting productivity and the role of customer relationship management in a case study of home appliance manufacturing based on BSC method.

In this paper, we present an empirical investigation on a pipe industry using BSC method. The organization of this paper first presents details of the proposed model in section 2, while details of our findings are given in section 3 and concluding remarks are stated in section 4.

## 2. The proposed method

In this paper, we present an empirical investigation on measuring the performance of one of Iranian pipe makers located in city of Shiraz, Iran. The proposed study designs a questionnaire based on BSC and attempts to measure the performance of this firm. The proposed study of this paper designs questionnaire and distributes among 31 managers, 94 regular employees and 110 customers of this firm during the fiscal year ended 2011. There were 12 questions associated with managers, 15 questions were related to employees and customers completed 14 questions. The questionnaire were passed to some university professor and they confirmed the questions, we have also calculated Cronbach alpha and the results were well above the minimum acceptable limit, 0.70. We have investigated the firm in terms of four BSC perspective and, for each perspective, we have considered different criteria and tried to measure the present status and deviations from desirable targets.

## 3. The results

In this section, we present details of our survey on our findings on BSC perspectives.

### 3.1. Financial figures

The first and the most important part of BSC perspective is associated with financial figures. There are three factors including revenue, cost and resources/consumptions. Table 1 demonstrates details of our findings,

**Table 1**

The results of forecasted and actual numbers for financial figures (Data are in Rials)

Objective		Forecasted	Actual	Performance
Incomes	Sales	8,458,000,000	3,260,205,008	38.5%
	Profit	27,045,500,000	9,720,686,528	35.9%
	Commissions	1,493,800,000	1,588,448,700	106.3%
Costs	Operating costs	7,181,000,000	6,087,007,000	115.23%
	Raw material, wages	13,645,769,000	15,924,165,480	-116.7%
Resources/consumptions	Cash flow growth	317,536,000,000	336,698,000,000	106%
	Consumption growth	271,844,000,000	284,418,000,000	4.6%

The results of Table 1 demonstrate that the proposed case study could only reach to approximately 41.4% of its targets.

### 3.2. Learning and Growth

Learning and growth includes four categories and each category consists of two to four items summarized in Table 2.

**Table 2**

The results of forecasted and actual numbers for learning and growth

Objective		Forecasted	Actual	Performance
Product and technology	Growth trend on technology improvement	5	3.7747	75.4
	Update software and hardware requirements	5	4.0745	81.5
Development	Implementation of necessary training programs	5	2.84	56.8
Improving organizational Culture	Employment benefit package	5	3.44	68.8
	Job promotion opportunity	5	2.93	58.6
Increase in Employee job satisfaction	Employment benefit package	5	3.3	66
	Promotion opportunities	5	2.83	56.6
	Job identity	5	3.9521	79
	Management	5	3.8777	77.5
Empowering Employees' capabilities	Necessary budget for purchasing books	4000000	4000000	100
	Number of training programs	20	9	45
	Number of trained employees	148	131	88.5
	Hours of training programs	228	156	68.4

As we can observe from the results of Table 2, the firm could reach up to 100 percent of its goals but there were some shortcomings especially on the number of training programs. Nevertheless, the firms could reach approximately to 71% of its learning and growth objectives.

### 3.3. Internal processes

The third component of BSC methodology is associated with measuring different internal processes' capabilities. This item has been categorized into three areas and Table 3 demonstrates details of forecasted and actual performances.

**Table 3**

The results of forecasted and actual numbers for internal process

Objective		Forecasted	Actual	Performance
Improvement in internal processes	Job formalities	1	2.68	46.4
	Work time measurements	1	1.935	61.3
	Number of rework	1	1.97	60.6
Improving safety and Security within organization	Laws and regulation	5	3.77	75.4
	Health of organization	5	4.47	89.4
Organizational change	The number of related training programs	5	3.32	66.4
	Employee motivation to upgrade educations	5	3.48	69.6
	Managers motivation for employee education	5	3.00	60

According to the results of Table 3, the proposed case study of this paper could reach about two third of the targets for most items or approximately 66%. It seems that health of organization was the first priority where the firm reached 89.4% of its target. In addition, "job formalities" was the least priority where the firm could not reach its target.

### 3.4. Customer

Customer plays an important role for business development and we have detected five important factors influencing customers, which are summarized in Table 4 as follows,

**Table 4**

The results of forecasted and actual numbers for customer perspective

Objective	Forecasted	Actual	Performance	
Customer satisfaction	Being responsive	5	4.33	86.57
	Empathy	5	4.33	86.67
	Discipline	5	4.63	92.5
	Mutual trust and respect	5	4.50	90.06
	Appearance	5	4.06	81.1

According to the results of Table 4, customers are believed to be satisfied in terms of the feedback we observe and the firm reached approximately 87% of its objectives and 89% in terms of internal processes. In addition, the firm could reach 89% of its objectives in terms of customer perspectives.

#### 4. Conclusion

In this paper, we have presented an empirical investigation to measure the performance of a firm, which was active in pipe production industry. There were four perspective associated with BSC framework including financials, learning and growth, internal process and customers. In terms of financial figures, the firm could reach only 41.4% of its objectives but this ratio reached 71% in terms of learning and growth,

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